

U.S. Patent Application No. 10/653,520
Amendment dated June 29, 2005
Reply to Office Action of March 29, 2005

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claims 1-27 (Canceled)

28. (Currently amended) Oxygen-reduced valve metal oxide particles having an average primary particle size of from 1 micron to 10.5 microns and a flow of from about 20 mg/s to about 270 mg/s or less, wherein said oxygen-reduced valve metal oxide particles are oxygen-reduced niobium oxide particles.

29. (Previously presented) The oxygen-reduced valve metal oxide particles of claim 28, wherein said particles have a specific surface area of from about $0.5 \text{ m}^2/\text{g}$ or higher.

30. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 28, wherein said particles have a specific surface area of from about $0.5 \text{ } \underline{1.0}$ to about $10 \text{ m}^2/\text{g}$.

31. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 28, wherein said specific surface area is from about $0.5 \text{ } \underline{2.0}$ to about $2.0 \text{ } \underline{10} \text{ m}^2/\text{g}$.

32. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 28, wherein said particles have a specific surface area of from about 1.0 to about $1.5 \text{ } \underline{2.0} \text{ m}^2/\text{g}$.

33. (Previously presented) The oxygen-reduced valve oxide particles of claim 28, wherein said particles have an apparent density of less than about 2.0 g/cc.

34. (Previously presented) The oxygen-reduced valve metal oxide particles of claim 28, wherein said particles have an apparent density of less than about 1.5 g/cc.

35. (Previously presented) The oxygen-reduced valve metal oxide particles of claim 28, wherein said particles have an apparent density of from 0.5 to about 1.5 g/cc.

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36. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 28, wherein said particles, when formed into an anode, have a capacitance capability of from 1,000 to about 300,000 62,000 CV/g.

37. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 28, wherein said particles, when formed into an anode, have a capacitance capability of from about 62,000 to about 200,000 300,000 CV/g.

38. (Previously presented) Agglomerated oxygen-reduced valve metal oxide comprising agglomerate sizes of less than 425 microns.

39. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 38, wherein said agglomerate size is less than 300 microns.

40. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 38, wherein said agglomerate size is from 150 to 300 microns.

41. (Currently amended) Agglomerated oxygen-reduced valve metal oxide having a flow of from about 20 mg/s to about 270 mg/s or less.

42-46. (Canceled)

47. (Previously presented) The agglomerated oxygen-reduced valve metal oxides of claim 41, wherein said oxygen-reduced valve metal oxide is aluminum oxide.

48. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 41, wherein said oxygen-reduced valve metal oxide is tantalum oxide.

49. (Currently amended) The agglomerated oxygen-reduced valve metal oxide of claim 41, wherein said oxygen-reduced valve reduced metal oxide is a titanium oxide.

50. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 41, wherein said oxygen-reduced valve metal oxide is zirconium oxide.

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51. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 41, wherein said oxygen-reduced valve metal oxide is vanadium oxide.

52. (Previously presented) An agglomerated product comprising an oxygen-reduced valve metal oxide powder coated with at least one additive.

53. (Previously presented) The agglomerated product of claim 52, wherein at least 75% of the surface area of the oxygen-reduced valve metal oxide powder is coated with said at least one additive.

54. (Previously presented) The agglomerated product of claim 52, wherein said additive is at least one binder, lubricant, or both.

55. (Previously presented) The agglomerated product of claim 52, wherein said additive is polypropylene carbonate, alkyd resin solution, polyethylene glycol, polyvinylalcohol, stearic acid, ammonium carbonate, camphor, polypropylene oxide, polyethylene glycol monomethyl ether, polyethylene dimethyl ether, a fatty acid other than stearic acid, or combinations thereof.

56. (Canceled)

57. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 28 56, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is less than 2 and y is less than 2.

58. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 28 56, wherein said oxygen-reduced niobium oxide is $NbO_{0.7}$, NbO , $NbO_{1.1}$, or combinations thereof.

59. (Canceled)

60. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 59

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30, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is less than 2 and y is less than 2.

61. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 59 30, wherein said oxygen-reduced niobium oxide is $NbO_{0.7}$, NbO , $NbO_{1.1}$, or combinations thereof.

62. (Canceled)

63. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 62 33, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is less than 2 and y is less than 2.

64. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 62 33, wherein said oxygen-reduced niobium oxide is $NbO_{0.7}$, NbO , $NbO_{1.1}$, or combinations thereof.

65. (Canceled)

66. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 65 31, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is less than 2 and y is less than 2.

67. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 65 31, wherein said oxygen-reduced niobium oxide is $NbO_{0.7}$, NbO , $NbO_{1.1}$, or combinations thereof.

68. (Canceled)

69. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 68 32, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is less than 2 and y is less than 2.

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70. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 68 32, wherein said oxygen-reduced niobium oxide is NbO_{0.7}, NbO, NbO_{1.1}, or combinations thereof.

71. (Canceled)

72. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 71 35, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is less than 2 and y is less than 2.

73. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 71 35, wherein said oxygen-reduced niobium oxide is NbO_{0.7}, NbO, NbO_{1.1}, or combinations thereof.

74. (Canceled)

75. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 74 34, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is less than 2 and y is less than 2.

76. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 74 34, wherein said oxygen-reduced niobium oxide is NbO_{0.7}, NbO, NbO_{1.1}, or combinations thereof.

77. (Canceled)

78. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 77 37, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is less than 2 and y is less than 2.

79. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 77 37, wherein said oxygen-reduced niobium oxide is NbO_{0.7}, NbO, NbO_{1.1}, or combinations

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thereof.

80. (Canceled)

81. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 80 36, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is less than 2 and y is less than 2.

82. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 80 36, wherein said oxygen-reduced niobium oxide is $NbO_{0.7}$, NbO , $NbO_{1.1}$, or combinations thereof.

83. (Canceled)

84. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 83 29, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is less than 2 and y is less than 2.

85. (Currently amended) The oxygen-reduced valve metal oxide particles of claim 83 29, wherein said oxygen-reduced niobium oxide is $NbO_{0.7}$, NbO , $NbO_{1.1}$, or combinations thereof.

86. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 38, wherein said agglomerated oxygen-reduced valve metal oxide is oxygen-reduced niobium oxide.

87. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 86, wherein said agglomerated oxygen-reduced niobium oxide has the formula Nb_xO_y , wherein x is less than 2 and y is less than 2.

88. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 86, wherein said agglomerated oxygen-reduced niobium oxide is $NbO_{0.7}$, NbO , $NbO_{1.1}$, or

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combinations thereof.

89. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 39, wherein said agglomerated oxygen-reduced valve metal oxide is oxygen-reduced niobium oxide.

90. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 89, wherein said agglomerated oxygen-reduced niobium oxide has the formula Nb_xO_y , wherein x is less than 2 and y is less than 2.

91. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 89, wherein said agglomerated oxygen-reduced niobium oxide is $NbO_{0.7}$, NbO , $NbO_{1.1}$, or combinations thereof.

92. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 40, wherein said agglomerated oxygen-reduced valve metal oxide is oxygen-reduced niobium oxide.

93. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 92, wherein said agglomerated oxygen-reduced niobium oxide has the formula Nb_xO_y , wherein x is less than 2 and y is less than 2.

94. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 92, wherein said agglomerated oxygen-reduced niobium oxide is $NbO_{0.7}$, NbO , $NbO_{1.1}$, or combinations thereof.

95. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 41, wherein said agglomerated oxygen-reduced valve metal oxide is oxygen-reduced niobium oxide.

96. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of

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claim 95, wherein said agglomerated oxygen-reduced niobium oxide has the formula Nb_xO_y , wherein x is less than 2 and y is less than 2.

97. (Previously presented) The agglomerated oxygen-reduced valve metal oxide of claim 95, wherein said agglomerated oxygen-reduced niobium oxide is $\text{NbO}_{0.7}$, NbO , $\text{NbO}_{1.1}$, or combinations thereof.

98-112. (Canceled)

113. (Currently amended) Oxygen-reduced niobium oxide particles having an average particle size of from 1 micron to 10.5 microns, having a flow of from about 20 mg/s to about 270 mg/s or less, a specific surface area of about $0.5 \text{ m}^2/\text{g}$ or higher, an apparent density of less than about 2.0 g/cc, and a capacitance of from 20,000 CV/g to about 300,000 CV/g when formed into an anode with a press density of 3.5 g/cc, a sintering temperature of 1,300 °C for 10 minutes, a formation voltage of 30 volts, and a formation temperature of 60°C.

114. (Previously presented) The oxygen-reduced niobium oxide particles of claim 113, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is less than 2 and y is less than 2.

115. (Currently amended) The oxygen-reduced niobium oxide particles of claim 113, wherein said oxygen-reduced niobium oxide is $\text{NbO}_{0.7}$, NbO , $\text{NbO}_{1.1}$, or combinations thereof.

116. (Previously presented) The oxygen-reduced niobium oxide particles of claim 113, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

117. (Previously presented) The oxygen-reduced niobium oxide particles of claim 113, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to

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1.1.

118. (Previously presented) The oxygen-reduced niobium oxide particles of claim 113, wherein said oxygen-reduced niobium oxide is agglomerated and has agglomerate sizes of less than 425 microns.

119. (Previously presented) The oxygen-reduced niobium oxide particles of claim 118, wherein said agglomerate size is less than 300 microns.

120. (Previously presented) The oxygen-reduced niobium oxide particles of claim 118, wherein said agglomerate size is from 150 to 300 microns.

121. (Currently amended) The oxygen-reduced niobium oxide particles of claim 113, wherein said particles have a specific surface area of from about 0.5 1.0 to about $10\text{ m}^2/\text{g}$.

122. (Currently amended) The oxygen-reduced niobium oxide particles of claim 113, wherein said specific surface area is from about 0.5 2.0 to about 2.0 10.0 m^2/g .

123. (Previously presented) The oxygen-reduced niobium oxide particles of claim 113, wherein said particles have a specific surface area of from about 1.0 to about $1.5\text{ m}^2/\text{g}$.

124. (Previously presented) The oxygen-reduced niobium oxide particles of claim 113, wherein said particles have an apparent density of from 0.5 to about 1.5 g/cc .

125. (Previously presented) The oxygen-reduced niobium oxide particles of claim 113, wherein said particles, when formed into an anode, have a capacitance of from about 62,000 to about 200,000 CV/g.

126. (Previously presented) The agglomerated product of claim 52, wherein said oxygen-reduced valve metal oxide powder is oxygen-reduced niobium oxide powder.

127. (Previously presented) The agglomerated product of claim 126, wherein said oxygen-reduced niobium oxide powder has the formula Nb_xO_y wherein x is less than 2 and y is

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less than 2.

128. (Previously presented) The agglomerated product of claim 126, wherein said oxygen-reduced niobium oxide powder is $\text{NbO}_{0.7}$, NbO , $\text{NbO}_{1.1}$, or combinations thereof.

129. (Previously presented) The agglomerated product of claim 126, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

130. (Previously presented) The agglomerated product of claim 126, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1..

131. (Previously presented) The agglomerated product of claim 55, wherein said oxygen-reduced valve metal oxide powder is oxygen-reduced niobium oxide powder.

132. (Previously presented) The agglomerated product of claim 131, wherein said oxygen-reduced niobium oxide powder has the formula Nb_xO_y wherein x is less than 2 and y is less than 2.

133. (Previously presented) The agglomerated product of claim 131, wherein said oxygen-reduced niobium oxide powder is $\text{NbO}_{0.7}$, NbO , $\text{NbO}_{1.1}$, or combinations thereof.

134. (Previously presented) The agglomerated product of claim 131, wherein said oxygen-reduced niobium oxide powder has the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

135. (Previously presented) The agglomerated product of claim 131, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

136. (Previously presented) The oxygen-reduced niobium oxide particles of claim 113, wherein said powder when formed into said anode has a DC leakage of 5.0 nA/CV or less.

137. (New) The oxygen-reduced valve metal oxide particles of claim 28, wherein said oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to

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less than 2.

138. (New) The oxygen-reduced valve metal oxide particles of claim 28, wherein said oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

139. (New) The oxygen-reduced valve metal oxide particles of claim 29, wherein said oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

140. (New) The oxygen-reduced valve metal oxide particles of claim 29, wherein said oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

141. (New) The oxygen-reduced valve metal oxide particles of claim 30, wherein said oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

142. (New) The oxygen-reduced valve metal oxide particles of claim 30, wherein said oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

143. (New) The oxygen-reduced valve metal oxide particles of claim 31, wherein said oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

144. (New) The oxygen-reduced valve metal oxide particles of claim 31, wherein said oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

145. (New) The oxygen-reduced valve metal oxide particles of claim 32, wherein said

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oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

146. (New) The oxygen-reduced valve metal oxide particles of claim 32, wherein said oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

147. (New) The oxygen-reduced valve metal oxide particles of claim 33, wherein said oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

148. (New) The oxygen-reduced valve metal oxide particles of claim 33, wherein said oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

149. (New) The oxygen-reduced valve metal oxide particles of claim 35, wherein said oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

150. (New) The oxygen-reduced valve metal oxide particles of claim 35, wherein said oxygen-reduced niobium oxide particles have the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

151. (New) The agglomerated oxygen-reduced valve metal oxide of claim 86, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

152. (New) The agglomerated oxygen-reduced valve metal oxide of claim 86, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

153. (New) The agglomerated oxygen-reduced valve metal oxide of claim 89, wherein

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said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

154. (New) The agglomerated oxygen-reduced valve metal oxide of claim 89, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

155. (New) The agglomerated oxygen-reduced valve metal oxide of claim 92, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

156. (New) The agglomerated oxygen-reduced valve metal oxide of claim 92, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

157. (New) The agglomerated oxygen-reduced valve metal oxide of claim 95, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

158. (New) The agglomerated oxygen-reduced valve metal oxide of claim 95, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

159. (New) The oxygen-reduced niobium oxide particles of claim 118, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

160. (New) The oxygen-reduced niobium oxide particles of claim 118, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

161. (New) The oxygen-reduced niobium oxide particles of claim 121, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

162. (New) The oxygen-reduced niobium oxide particles of claim 121, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

163. (New) The oxygen-reduced niobium oxide particles of claim 122, wherein said

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oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.

165. (New) The oxygen-reduced niobium oxide particles of claim 122, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to 1.1.

166. (New) The oxygen-reduced niobium oxide particles of claim 124, wherein said oxygen-reduced niobium oxide has the formula Nb_xO_y wherein x is 1 and y is 0.7 to less than 2.